Maryland Public Health Strategy for Climate Change

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Adaptation and Response Working Group

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Maryland Public Health Strategy for Climate Change

- Funded by CDC under Climate Ready States and Cities Initiative using the BRACE process

- Maryland funded 2012-2016

- Based on State-specific concerns:
  - Injury (heat, physical injuries)
  - Foodborne illness (e.g., Salmonella)
  - Waterborne disease (e.g., *Vibrio*)
  - Respiratory disease (e.g., asthma)
  - Vector-Borne Disease (e.g., West Nile Virus, Lyme Disease)

Objectives of Climate and Health Profile Report

- How have extreme heat and precipitation events affected the health of Marylanders historically?

- Based on models of climate change, how will anticipated changes in extreme weather events affect health in the future?

- How will these impacts affect different groups, and are some groups especially vulnerable?

Building Resilience Against Climate Effects

Climate Forecasts

Disease Projections

01 Forecasting Climate Impacts and Assessing Vulnerabilities

Projecting the Disease Burden

Evaluation

05

BRACE
Building Resilience
Against Climate Effects

02

Assess Interventions

Evaluating Impact and Improving Quality of Activities

Assessing Public Health Interventions

Climate-Health Adaptation Plan

04 Developing and Implementing a Climate and Health Adaptation Plan

03
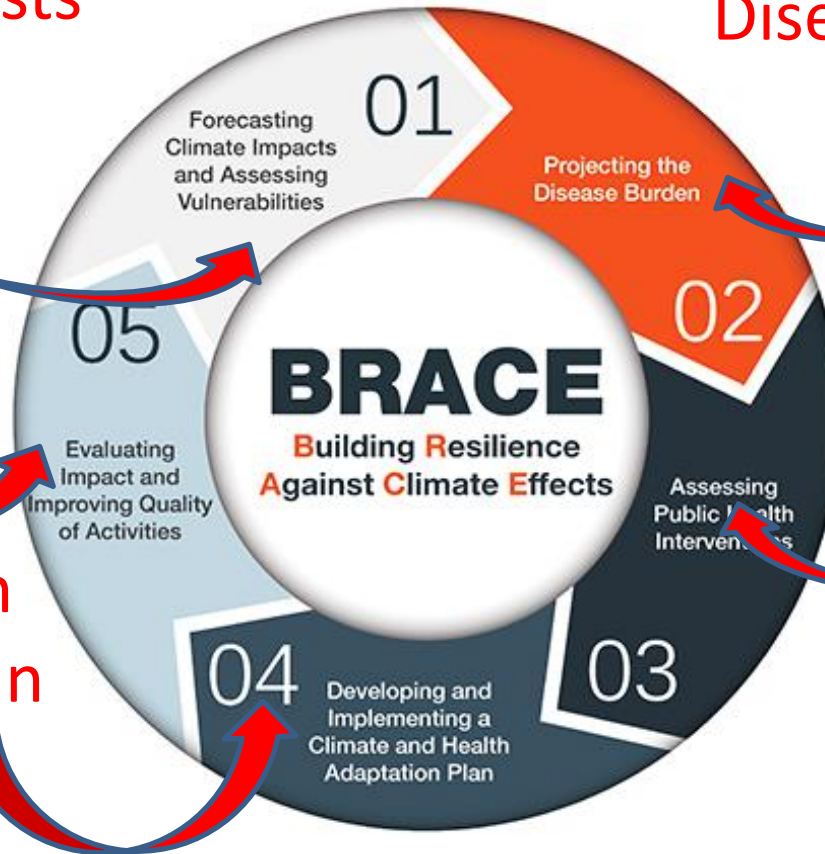
MARYLAND

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Collaborative Process

- Local Public Health Departments
  - Baltimore City
  - Prince George's County
  - Washington County
  - Wicomico County
- University of Maryland, School of Public Health
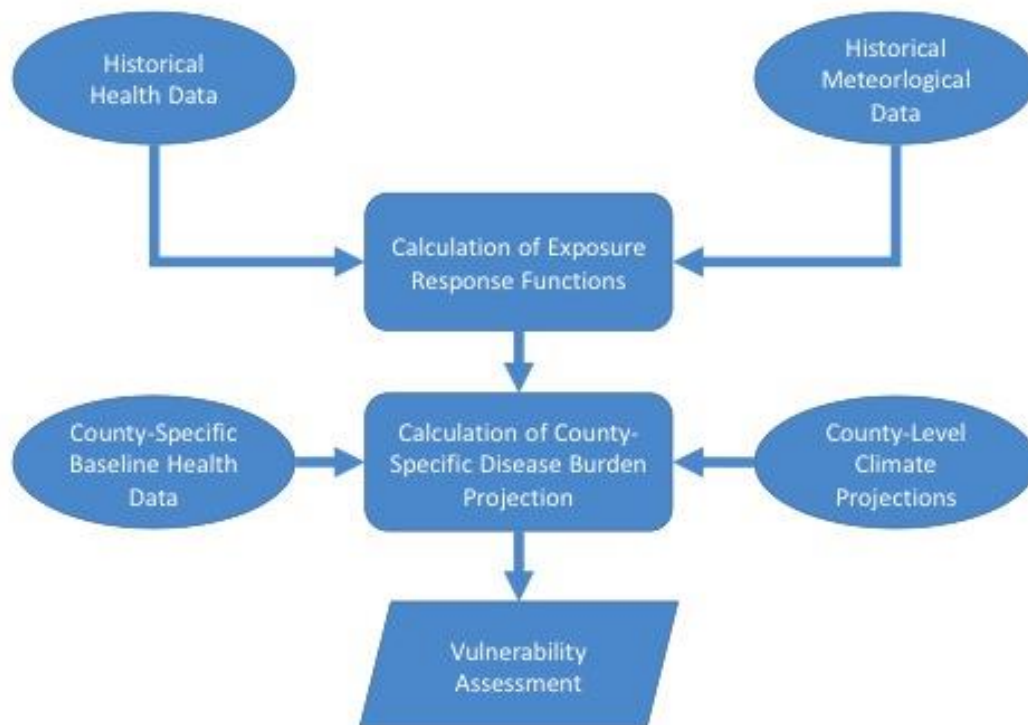- DHMH-MDE Environmental Public Health Tracking

Methodology

BASELINE HEALTH ASSESSMENT

Demographic and Social Determinants of Health (Δ 2005-2000)

*Rate per 100,000 residents

Morbidity

Legend: ■ Prince George's ■ Maryland

Chart categories (x-axis):
- Acute myocardial infarction
- Asthma
- All cancer incidence (2005-2008)
- Total injuries (hospitalizations)
- Total injuries (ED visits)
- Motor vehicle injuries (hospitalizations)
- Motor vehicle injuries (ED visits)
- Natural environment (hospitalizations)
- Natural environment (ED visits)
- Lyme disease
- Rabies

Y-axis: -200.0 to 1400.0

CLIMATE FORECAST AND ASSESSING VULNERABILITIES
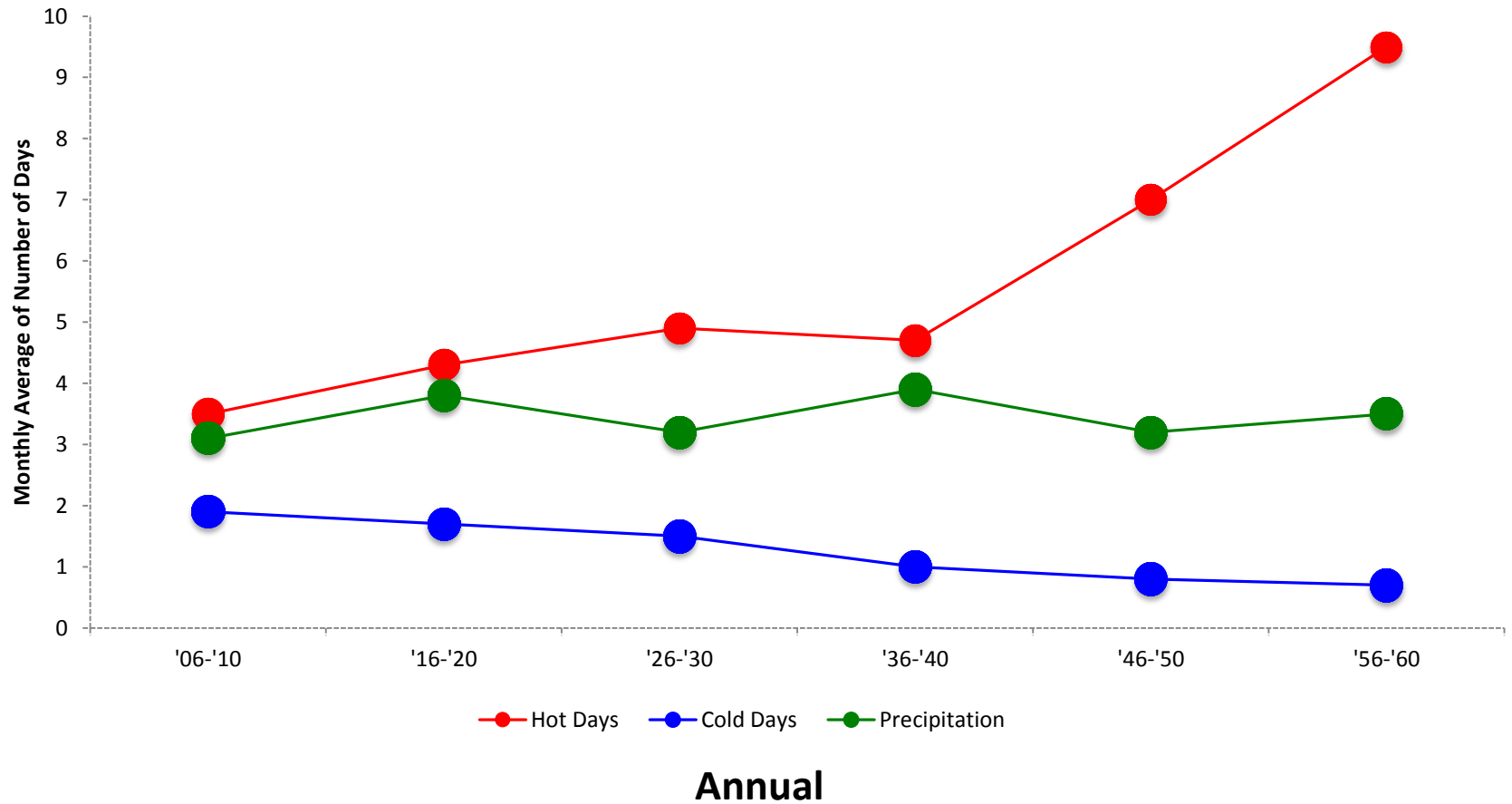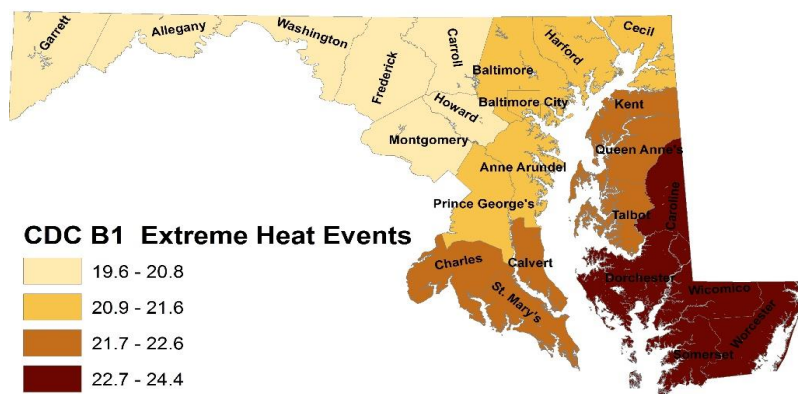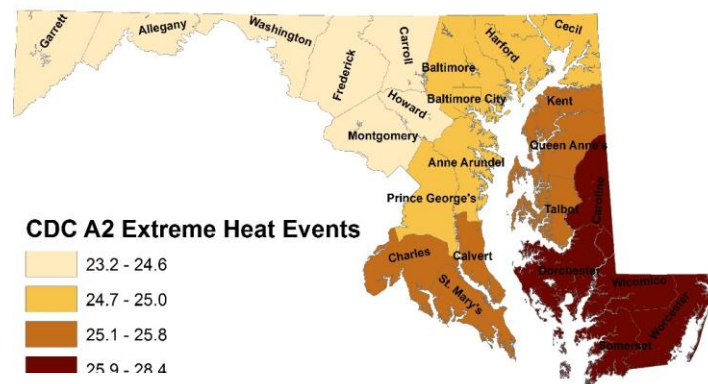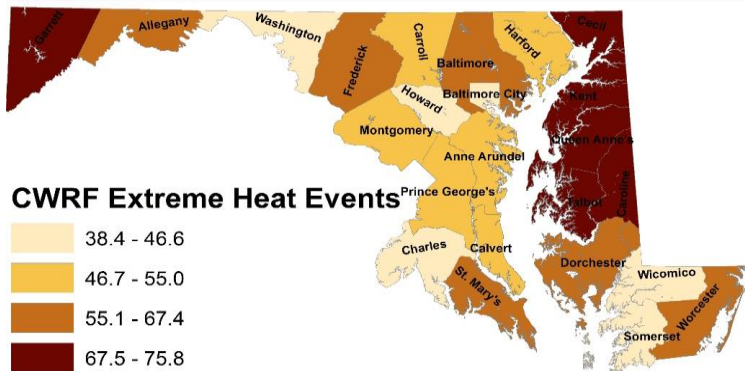
Vulnerability Assessment

- Frequency of extreme events in Maryland (1960-2012)
  - Summertime extreme heat events more than doubled during the 1980s, 1990s, and 2000s compared with the 1960s, 1970s.
  - Seasonal frequency of extreme precipitation events relatively stable in Maryland over the past 50 years (since 1960).
  - Spatial distribution of extreme heat and precipitation events varied across all of the 24 counties in Maryland.

Projected Extreme Heat Days
Year 2040

CWRF Extreme Heat Events
- 38.4 - 46.6
- 46.7 - 55.0
- 55.1 - 67.4
- 67.5 - 75.8

CDC A2 Extreme Heat Events
- 23.2 - 24.6
- 24.7 - 25.0
- 25.1 - 25.8
- 25.9 - 28.4

CDC B1 Extreme Heat Events
- 19.6 - 20.8
- 20.9 - 21.6
- 21.7 - 22.6
- 22.7 - 24.4

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Projected Meteorological Data

- Notable findings:
  - **Extreme heat event frequency likely to continue to increase through 2040**
  - **Extreme precipitation event frequency likely to remain relatively stable through 2040**
  - **Likely spatial pattern of extreme heat events in 2040 most closely aligned with the observed extreme heat events during 2000-2010**

DISEASE BURDEN PROJECTION

Asthma Hospitalization: Odds Ratios w/ 95 % CI for Exposure to Extreme Events

VARIABLES	HEAT	PRECIPITATION
	ODDS RATIO (95% CI)	
Overall Model	1.22 (1.15 – 1.33)	1.11 (1.06 – 1.17)
Gender		
Female	1.24 (1.13 – 1.35)	1.11 (1.04 –1.18)
Male	1.22 (1.08 – 1.38)	1.12 (1.04 –1.22)
Age Group		
Under 5	1.08 (0.87 – 1.34)	1.20 (1.05 – 1.37)
5 to 17	1.36 (1.05 – 1.77)	1.11 (0.94 – 1.30)
18 to 64	1.28 (1.16 – 1.41)	1.11 (1.04 – 1.18)
65 and older	1.16 (1.00 – 1.35)	1.07 (0.96 – 1.19)
Race/Ethnicity		
Non-Hispanic White	1.33 (1.19 – 1.49)	1.09 (1.01 – 1.18)
Non-Hispanic Black	1.20 (1.08 – 1.33)	1.13 (1.06 – 1.21)
Hispanic	0.67 (0.41 – 1.09)	1.16 (0.85 – 1.60)

Salmonellosis: Incidence Rate Ratios w/ 95% CI for Exposure to Extreme Events

Characteristics		Extreme Temp. (ETT_{95})	Extreme Precip. (EPT_{90})
Overall Model		1.041[1.013-1.069]	1.056[1.035-1.078]
Season			
	Spring	0.961[0.926-0.997]	1.013[0.984-1.042]
	Summer	1.045[1.014-1.077]	1.017[0.989-1.046]
	Fall	1.004[0.964-1.045]	1.037[1.015-1.060]
	Winter	0.962[0.928-0.998]	1.012[0.972-1.053]
Geographical Location			
	Coastal Counties	1.051[1.023-1.081]	1.071[1.044-1.099]
	Non-Coastal Counties	1.015[0.977-1.055]	1.036[1.017-1.054]

Considerably larger effect observed in coastal counties compared to non-coastal counties
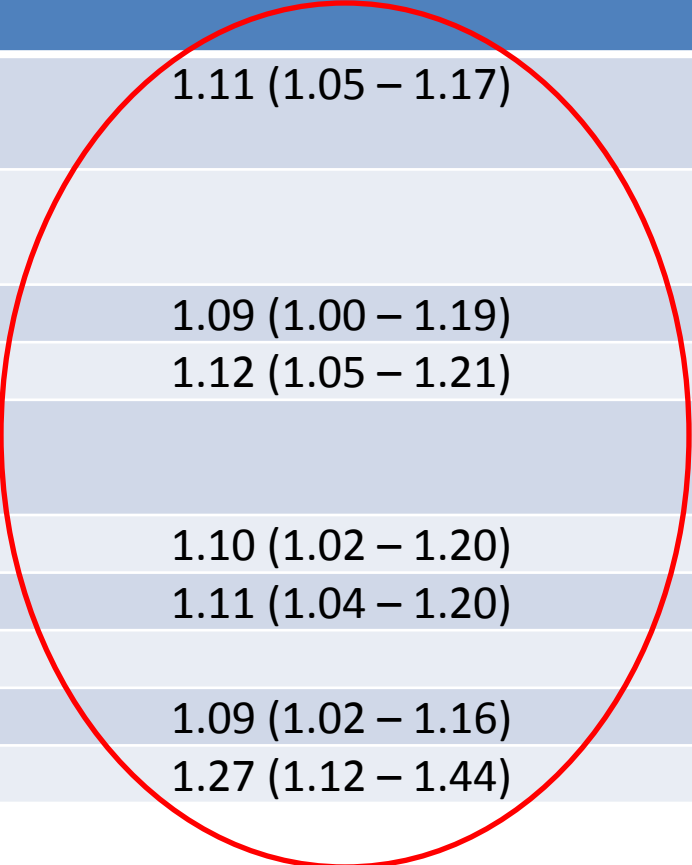
Campylobacter Incident Rate Ratio
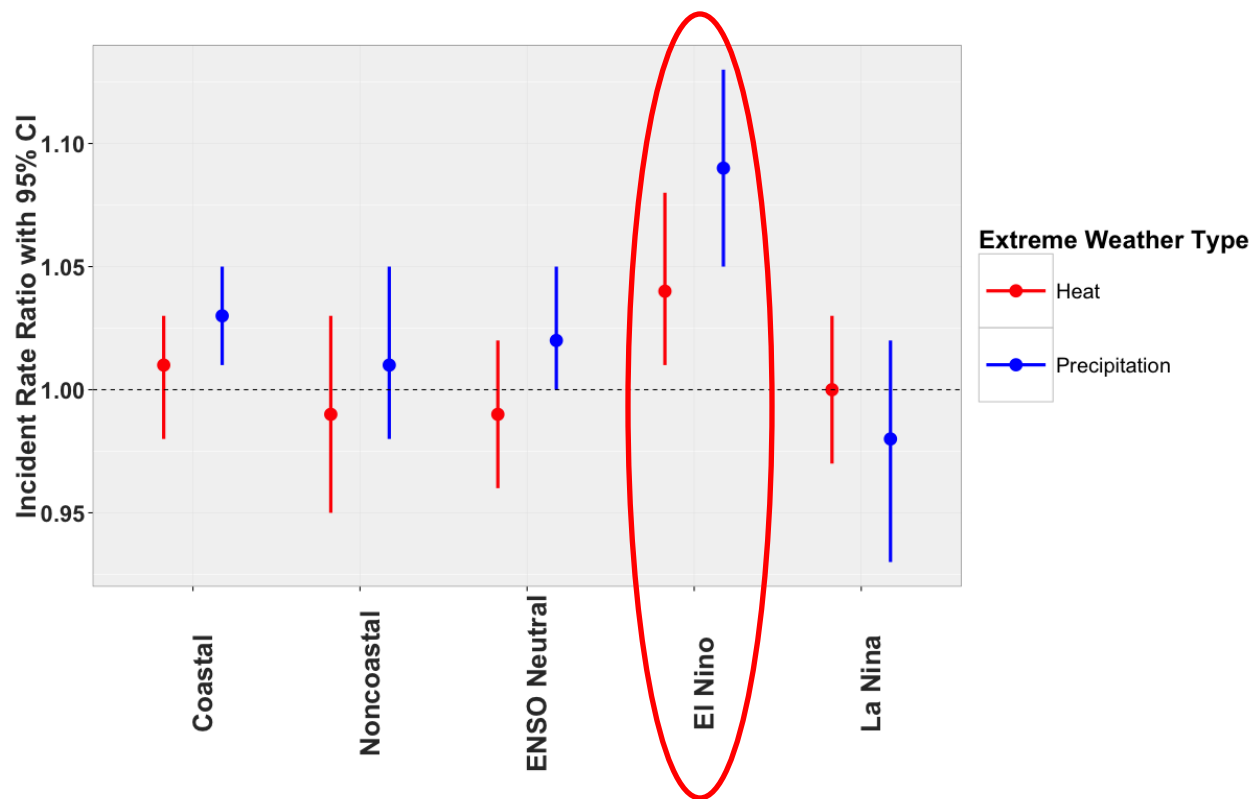
MI Hospitalization: Odds Ratios w/ 95% CI for Exposure to Extreme Heat

VARIABLES	ODDS RATIO (95% CI)
Overall Model	1.11 (1.05 – 1.17)
Gender	
Female	1.09 (1.00 – 1.19)
Male	1.12 (1.05 – 1.21)
Age	
18 to 64	1.10 (1.02 – 1.20)
65 and older	1.11 (1.04 – 1.20)
Race/Ethnicity	
Non-Hispanic White	1.09 (1.02 – 1.16)
Non-Hispanic Black	1.27 (1.12 – 1.44)

Vehicle Injury: Incidence Rate Ratios w/ 95% CI for Exposure to Extreme Events

Characteristics	Extreme Temp. (ETT_{95})	Extreme Precip. (EPT_{90})
Overall Model	1.01 [1.00-1.02]	1.23 [1.22-1.24]
Season		
Spring	1.05 [1.03, 1.07]	1.20 [1.18, 1.21]
Summer	1.09 [1.07, 1.10]	1.24 [1.22, 1.25]
Fall	0.88 [0.86, 0.90]	1.32 [1.31, 1.34]
Winter	0.97 [0.96, 0.99]	1.13 [1.12, 1.15]

Ranking of Disease Burden Projection

- Low Impact
  - If the increase in projected disease burden in 2040 is less than 50% of the 2010 baseline period.

- Medium Impact
  - If the increase in projected disease burden in 2040 is between 50-100% of the 2010 baseline period.

- High Impact
  - If the increase in projected disease burden in 2040 is greater than 100% of the 2010 baseline period.

Maryland

Projected change in disease rates associated with extreme heat events in Maryland during summer months.

HEALTH OUTCOME	RATES IN SUMMER*			PROJECTION RANKING
	2010	2040	% Change	
Salmonella Infection	6.1	7.8	28.0	Low
Hospitalization for Heart Attack	38.2	64.3	68.4	Medium
Hospitalization for Asthma	29.4	69.6	136.8	High

*=Rate per 100,000 residents, calculated as a seasonal average.

COUNTY PROFILES

Baltimore City

Projected change in disease rates associated with extreme heat events during summer months.

HEALTH OUTCOME	RATES IN SUMMER*			PROJECTION RANKING
	2010	2040	% Change	
Salmonella Infection	9.7	11	13.5	Low
Hospitalization for Heart Attack	52.8	121.0	129.0	High
Hospitalization for Asthma	86.6	180.2	108.0	High

*=Rate per 100,000 residents; Calculated as a seasonal average.

Prince George's County

Projected change in disease rates associated with extreme heat events during summer months.

HEALTH OUTCOME	RATES IN SUMMER*			PROJECTION RANKING
	2010	2040	% Change	
Salmonella Infection	4.1	4.8	16.9	Low
Hospitalization for Heart Attack	24.2	29.7	22.5	Low
Hospitalization for Asthma	22.2	38.9	75.0	Medium

*=Rate per 100,000 residents; Calculated as a seasonal average.

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Washington County

Projected change in disease rates associated with extreme heat events during summer months.

HEALTH OUTCOME	RATES IN SUMMER*			PROJECTION RANKING
	2010	2040	% Change	
Salmonella Infection	4.9	5.9	21.4	Low
Hospitalization for Heart Attack	49.2	39.9	-19.0	Low
Hospitalization for Asthma	19.8	91.3	361.0	High

*=Rate per 100,000 residents; Calculated as a seasonal average.

Wicomico County

Projected change in disease rates associated with extreme heat events during summer months.

HEALTH OUTCOME	RATES IN SUMMER*			PROJECTION RANKING
	2010	2040	% Change	
Salmonella Infection	16.6	17.9	7.9	Low
Hospitalization for Heart Attack	50.0	50.0	0	Low
Hospitalization for Asthma	22.9	31.7	38.5	Medium

*=Rate per 100,000 residents; Calculated as a seasonal average.
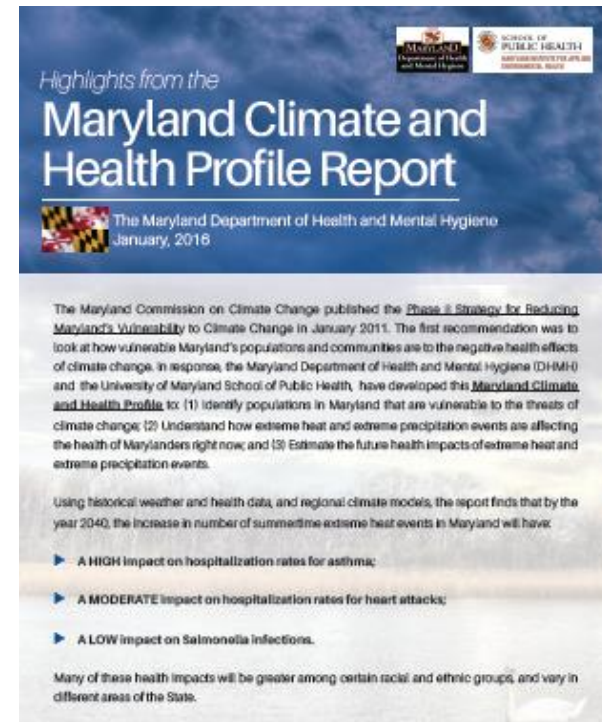
NEXT STEPS

- Integrate Climate-Health Profile with State Climate Action Plan

- Develop State-wide estimates for all jurisdictions

- Outreach with Profile, fact sheets, website

FURTHER COLLABORATIVE OPPORTUNITIES

- Local Health Departments

- Other State Agencies

- Non-Governmental Organizations

- Mid-Atlantic Region Public Health Officials
  - Regional collaboration on climate-health profiles
  - Facilitate regional data sharing and adaptation strategies

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MARYLAND

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HEALTH AND MENTAL HYGIENE

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